

Alternative Approaches to Funding Highways

About 25 percent of the nation's highways, which carry about 85 percent of all road traffic, are paid for in part by the federal government; the remaining funding for highways comes from state and local governments.¹ Federal spending on highways is funded primarily by taxes on gasoline and diesel fuel, but those and other taxes paid by highway users do not yield enough revenue to support either current federal spending on highways or the higher levels of spending that have been proposed by some observers. Although raising those taxes would bring in a larger amount of revenue, a more fundamental issue would remain: By themselves, fuel taxes cannot provide a strong incentive for people to avoid overusing highways—that is, to forgo trips for which the costs to themselves and others exceed the benefits. This study examines broad alternatives for federal funding of highways, focusing on fuel taxes and on taxes that could be assessed on the basis of the number of miles that vehicles travel.²

Approaches to funding highways can be evaluated in terms of equity and economic efficiency. Equity, or fairness, is subjective and can be assessed in several ways. Observers of highway funding often gauge fairness by considering the share of funding that is obtained from taxes paid by highway users rather than from general taxpayer funds, from people in households that fall into various income categories, or from people in rural versus urban households.

The economic efficiency of a funding approach depends partly on its effects on users' travel behavior and partly on what it costs to implement. Charging users for the costs their travel imposes on society would create

incentives for people to limit highway use to trips for which the benefits exceed the costs, thus reducing or eliminating overuse of highways and helping identify the economic value of investments in highways. However, the costs of collecting and enforcing such user charges also must be considered in evaluating their net effect on efficiency.

Charging for the Costs of Highway Use

The cost of users' travel is different from the cost of highway construction and maintenance, although those costs overlap. Some construction and maintenance costs are tied to use. For example, the cost of some maintenance depends on the extent of pavement damage caused by heavy vehicles. In contrast, other maintenance costs—such as those to repair damage caused by aging and weathering—are fixed and would accrue regardless of how much a road is used.

Any given driver's highway use also imposes costs on other users, on nearby nonusers, on the environment, and on the economy in the form of congestion, risk of accidents, noise, emissions of greenhouse gases and pollutants that affect local air quality, and dependence on foreign oil.

Different types of vehicles traveling in different locations contribute differently to the social costs of highway use. Passenger vehicles log more than 90 percent of all miles traveled on U.S. highways, and they are responsible for the largest share of the total costs of highway travel. In particular, urban travel by passenger vehicles constitutes about two-thirds of all vehicle-miles traveled, and it is the primary source of congestion, the largest category of social costs. Heavy trucks travel less than 10 percent of all vehicle miles, but their costs per mile are far higher than are those for passenger vehicles, and they are responsible for most pavement damage.

1. This study follows the practice of the Federal Highway Administration of using "highway" and "road" synonymously.

2. Related questions are discussed in Congressional Budget Office, *Spending and Funding for Highways*, Issue Brief, January 2011.

Estimates from several sources indicate that most highway users currently pay much less than the full cost of their travel. Given current fuel efficiency, federal and state fuel taxes combined produce revenue of roughly 2 cents per mile for automobiles. In contrast, the Federal Highway Administration estimates that the national average cost for congestion caused by automobile travel is about 10 cents per mile—much higher in large metropolitan areas and much lower in rural communities. Total costs, including those for accident risk and noise, are higher still.

Judging from estimates of the costs of highway use, a system that charged for all such costs would have most if not all motorists paying substantially more than they do now—perhaps several times more. Such a system would maximize the efficiency of highway use by discouraging trips for which costs exceed benefits. Alternatively, taxes that were set below the full costs of use but were structured to reflect those costs more closely than current taxes do could yield a portion of the efficiency gains by discouraging some high-cost trips.

Most of the costs of using a highway, including pavement damage, congestion, accidents, and noise, are tied more closely to the number of miles traveled than to the amount of fuel consumed. (Because of the way passenger vehicles are regulated, their emissions of local air pollutants, such as particulate matter and sulfur dioxide, also are more closely related to miles traveled. The cost of local air pollution from trucks, which is regulated differently, is fuel related.) Fuel consumption depends not only on the number of miles traveled but also on fuel efficiency, which can differ from one vehicle to another and can change with driving conditions; therefore, charging highway users for the full costs of their use, or in proportion to the full costs, could not be accomplished solely through fuel taxes. Accomplishing those goals would require a combination of fuel taxes and per-mile charges, sometimes called vehicle-miles traveled (VMT) taxes.

Fuel Taxes

Viewed according to different conceptions of equity, fuel taxes offer a mix of positive and negative characteristics. They satisfy a “user-pays” criterion, but they also can impose a larger burden, relative to income, on people who live in low-income or rural households (see Summary Table 1). Even for households that do not own passenger vehicles, the taxes impose an indirect burden

because they raise the transportation costs that are reflected in the prices of purchased goods.

Fuel taxes have two desirable characteristics for efficiency: They cost relatively little to implement (the government collects taxes from fuel distributors, and users pay the taxes when they purchase fuel), and they offer users some incentive to curtail fuel use, thus reducing some of the social costs of travel. At best, however, the strength of that incentive can be right only as a rough average, discouraging some travel too much and other travel too little, because it does not reflect the large differences in cost for use of crowded roads compared with uncrowded roads or for travel by trucks that have similar fuel efficiency but cause different amounts of pavement damage. Moreover, for a given tax rate on fuels, the incentive to reduce mileage-related costs diminishes over time as more driving is done in fuel-efficient vehicles.

Potential Taxes on Vehicle-Miles Traveled

VMT taxes are qualitatively similar to fuel taxes in their implications for equity. Like fuel taxes, they satisfy the user-pays principle, but they impose larger burdens relative to income on people in low-income or rural households. However, to the extent that members of such households tend to drive vehicles that are less fuel efficient, such as pickup trucks or older automobiles, those highway users would pay a smaller share of VMT taxes than of fuel taxes.

VMT taxes that are aligned with the costs imposed by users would provide a better incentive for efficient highway use than fuel taxes do because the majority of those costs are related to miles driven. However, VMT taxes’ effect on overall efficiency also would depend on how much it costs to put the taxes in place and to collect the money. Estimates of what it would cost to establish and operate a nationwide program are rough. One source of uncertainty is the cost to install metering equipment in all of the nation’s cars and trucks. Having the devices installed as original equipment under a mandate to vehicle manufacturers would be relatively inexpensive but could lead to a long transition; requiring vehicles to be retrofitted with the devices could be faster but much more costly, and the equipment could be more susceptible to tampering than factory-installed equipment might be. Despite the various uncertainties and impediments, some transportation experts have identified VMT taxes as a preferred option.

Summary Table 1.**Implications of Fuel Taxes and VMT Taxes**

	Equity			Efficiency			
	User Pays	Larger Relative Burden on Low-Income People ^a	Larger Relative Burden on People in Rural Areas	Address Fuel-Related Costs ^b	Address Mileage-Related Costs ^c	Collection Costs	Privacy Issues
Fuel Taxes	Yes	Generally, yes	Yes	Yes	Somewhat ^d	Low	No
VMT Taxes	Yes	Generally, yes, but perhaps less than fuel taxes	Yes, but less than fuel taxes	Significantly ^e	Yes	High	Yes

Source: Congressional Budget Office.

Note: VMT = vehicle-miles traveled.

- a. Some low-income people do not own motor vehicles; however, they pay fuel taxes indirectly because the prices of goods they buy reflect the goods' transportation costs.
- b. Fuel-related costs include greenhouse gas emissions, dependence on foreign oil, and local air pollution from trucks.
- c. Mileage-related costs include road wear, congestion, accidents, local air pollution from passenger vehicles, and noise.
- d. Fuel taxes would have proportionately less effect on miles driven than on fuel use and provide minimal incentive for users to avoid congestion or increase the number of axles on trucks they purchase.
- e. VMT taxes would have a proportionately equal effect on fuel use and mileage but provide no incentive for users to increase fuel efficiency.

One step in developing per-mile charges would be to determine the goals of VMT taxation; different goals would require different charges. For example, if VMT taxes were intended to maximize the efficiency of highway use, they would need to vary greatly by vehicle type and by time and place of travel. Pavement damage increases sharply with vehicle weight but decreases with the number of axles on a vehicle, so the portion of VMT taxes assessed to maintain pavement would need to be small or nonexistent for passenger vehicles but substantial for heavy-duty trucks, particularly those with high weight per axle. Similarly, every vehicle would be assessed more to travel on crowded urban roads during peak hours than in off-peak hours or to travel on less congested roads at any time. The rates charged for peak-hour travel would be set in keeping with specific local or regional conditions, including the duration and severity of daily congestion, rather than on the basis of national averages. If the VMT taxes were intended to achieve some other goal, the structure of the taxes might be different.

The idea of imposing VMT taxes that vary by time and place has raised concerns about privacy because the process of assessing such taxes could give the government access to specific information about how individual vehicles are used. Various approaches have been suggested to allay those concerns, including restricting the amount of information about a vehicle's travel that is used in billing

or restricting the kind of information that is conveyed to the government; making devices appealing to the public by allowing businesses to use them to provide other services, such as real-time traffic reports or electronic payment for parking; and allowing users to opt out of paying per-mile charges and instead pay higher fuel taxes. (The optional fuel taxes would be set at rates high enough to appeal only to users with the greatest privacy concerns.)

A system of VMT taxes need not apply to all vehicles on every road. Indeed, there are already less comprehensive systems of direct charges for road use: Toll roads, lanes, and bridges are common in the United States, and several states and foreign countries levy weight-and-distance charges on trucks. Expansion of existing systems could focus on highly congested roads or on entry points into congested areas; that targeted approach could cost less to implement if it required relatively simple in-vehicle equipment. (The E-ZPass transponder is one example. E-ZPass is an electronic collection system that allows prepayment of tolls in 14 states, from Maine in the northeast, to Virginia in the south, to Illinois in the west.) Alternatively, the focus could be on specific vehicle types, such as trucks. Although less than 4 percent of the nation's fleet is made up of trucks (excluding light-duty trucks), they account for roughly 25 percent of all costs highway users impose on others, including almost all of the costs associated with pavement damage.

